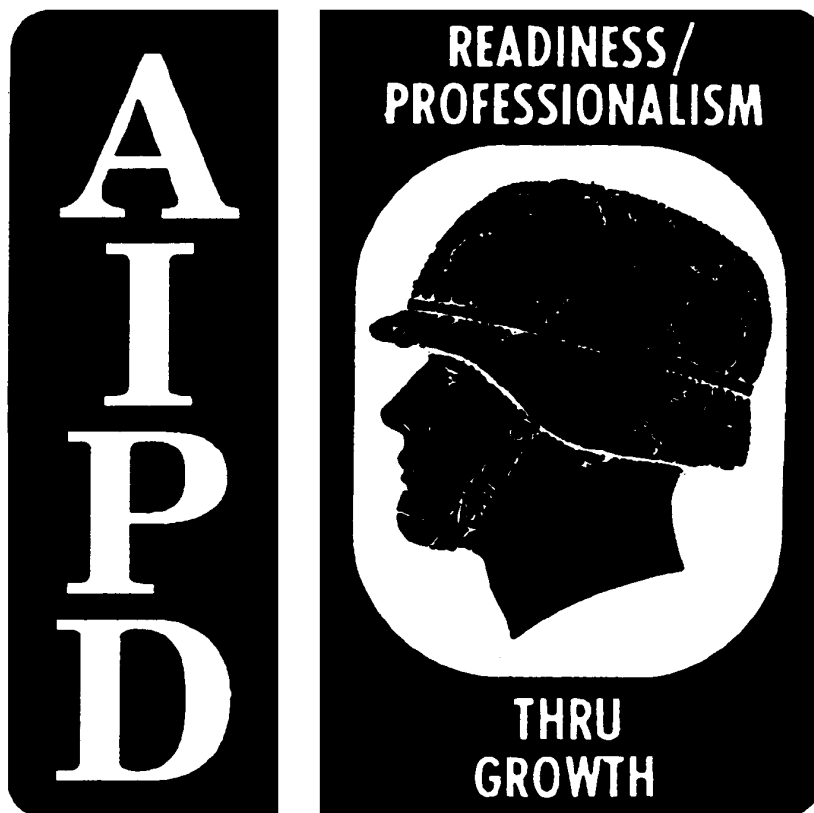


**PREPARE A PLUMBING TAKEOFF  
LIST (PLUMBING I)**



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**THE ARMY INSTITUTE FOR PROFESSIONAL DEVELOPMENT  
ARMY CORRESPONDENCE COURSE PROGRAM**

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PREPARE A PLUMBING TAKEOFF LIST

SUBCOURSE EN 5110

PLUMBER

MOS 51K 1 and 2

US Army Engineer School  
Fort Leonard Wood, Missouri

12 Credit Hours

GENERAL

The plumbing takeoff list subcourse, part of the Plumber, MOS 51K, Skill Levels 1 and 2, course, is designed to teach the knowledge necessary to extract information from a construction drawing legend, identify plumbing symbols, and use plumbing material. The subcourse is presented in two lessons, each lesson corresponding to a terminal objective as indicated below.

Lesson 1: USE DRAWING LEGENDS AND PLUMBING SYMBOLS

OBJECTIVE: Describe the methods used to extract information from a construction drawing legend and to identify plumbing symbols.

TASK: 051-248-1001, Prepare a plumbing takeoff list.

CONDITIONS: Given subcourse booklet EN 5110 and an examination response sheet. You will work in your own environment without supervision.

STANDARDS: You should be able to complete this lesson and answer the practice exercises within approximately 4 hours.

Lesson 2: LIST PLUMBING MATERIALS

OBJECTIVE: List plumbing materials by type, size, and length from a construction drawing.

TASK: 051-248-1001, Prepare a plumbing takeoff list.

CONDITIONS: Given subcourse booklet EN5110 and an examination response sheet. You will work in your own environment without supervision.

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## INTRODUCTION

An important part of building construction is the ability to read and understand the information shown on a construction drawing or a set of construction drawings. The drawings show what plumbing facilities are required by using symbols and abbreviations to identify the real material items. The symbols and abbreviations on the construction drawing tell the plumber the location of water and waste pipelines, the type and size of pipe, the type of fittings for pipeline connections, and the location of all the fixtures required.

Once you can read and understand the information on a construction drawing, you can determine the lengths of pipe required by type and size, the number of different types of fittings by size, and the number of different types of fixtures. You will be able to make a list of plumbing materials needed to install any part of or all of the plumbing system.

Lesson 1  
USE DRAWING LEGENDS AND PLUMBING SYMBOLS

OBJECTIVE

At the end of this lesson, you will be able to describe the methods used to extract information from a construction drawing legend and to identify plumbing symbols.

TASK

Task 051-248-1001, Prepare a plumbing takeoff list.

CONDITIONS

Given subcourse booklet EN5110 and an examination response sheet. You will work in your own environment without supervision.

STANDARDS

You should be able to complete this lesson and answer the review exercise within approximately 4 hours. You must respond correctly to 70 percent of the examination questions pertaining to this lesson.

CREDIT HOURS

4.

REFERENCES

TM 5-551K, TM 5-704, FM 5-51K.

Learning Event 1

READ A CONSTRUCTION DRAWING

1. A plumber has to read and understand the information on a construction drawing. The drawing has two areas, the legend and the diagram. The legend contains general information and the scale of the drawing. The diagram contains plumbing symbols giving the location of the plumbing system in a building.

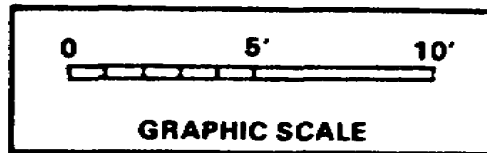
a. General information is in the legend of a construction drawing. "Schedule of Drawings," part of a legend in figure 1-1 on page 2, identifies all the drawings by number, number of sheets per drawing, and title of each drawing. "General Notes," also part of a legend in figure 1-1, gives additional information that is needed. Items 3, 4, and 5 are for the plumber. Note: The legend of a construction drawing is in the lower right hand corner.

FIGURE 1-1. INFORMATION IN A LEGEND

GENERAL NOTES	SCHEDULE OF DRAWINGS		
1. REFER TO TMS-303 FOR BUILDING SWELL REQUIREMENTS	DWG. NO.	DESCRIPTION	SHEET NO.
2. FOR FSN BILL OF MATERIALS - REFER TO TMS-303 BY FACILITY NUMBER	72-32	PLANS	1 OF 1
3. FOR DETAIL NO 1, "MIXING CONTROL FOR GROUP SHOWER" & DETAIL NO 2, "SHOWER HEAD & CONTROL VALVE," REFER TO DMS. NO. 72-35, SHEET 1 OF 1	72-35	PLUMBING DIAG & DETAILS	1 OF 1
4. -T- INDICATES TEMPERED WATER 5. INSTALL 45° Y-BRANCH WITH PLUG FOR C.O. ABOVE FLOOR WITH RISE FOR V.T.R.	99-98	STANDARD DETAILS	
	34-03	WOOD FRAME CONST. BARRACKS TYPE BLDGS	1-7 OF 7
	35-21	STEEL FRAME CONST. BARRACKS TYPE BLDGS	1-4 OF 4

b. The scale of a drawing can be either a graphic or ratio scale. In figure 1-2, each segment of the line equals one foot in the building. In figure 1-3, 1/4 inch on the drawing equals one foot in the building.

FIGURE 1-2. LEGEND, GRAPHIC SCALE



GRAPHIC SCALE

FIGURE 1-3. LEGEND, RATIO SCALE

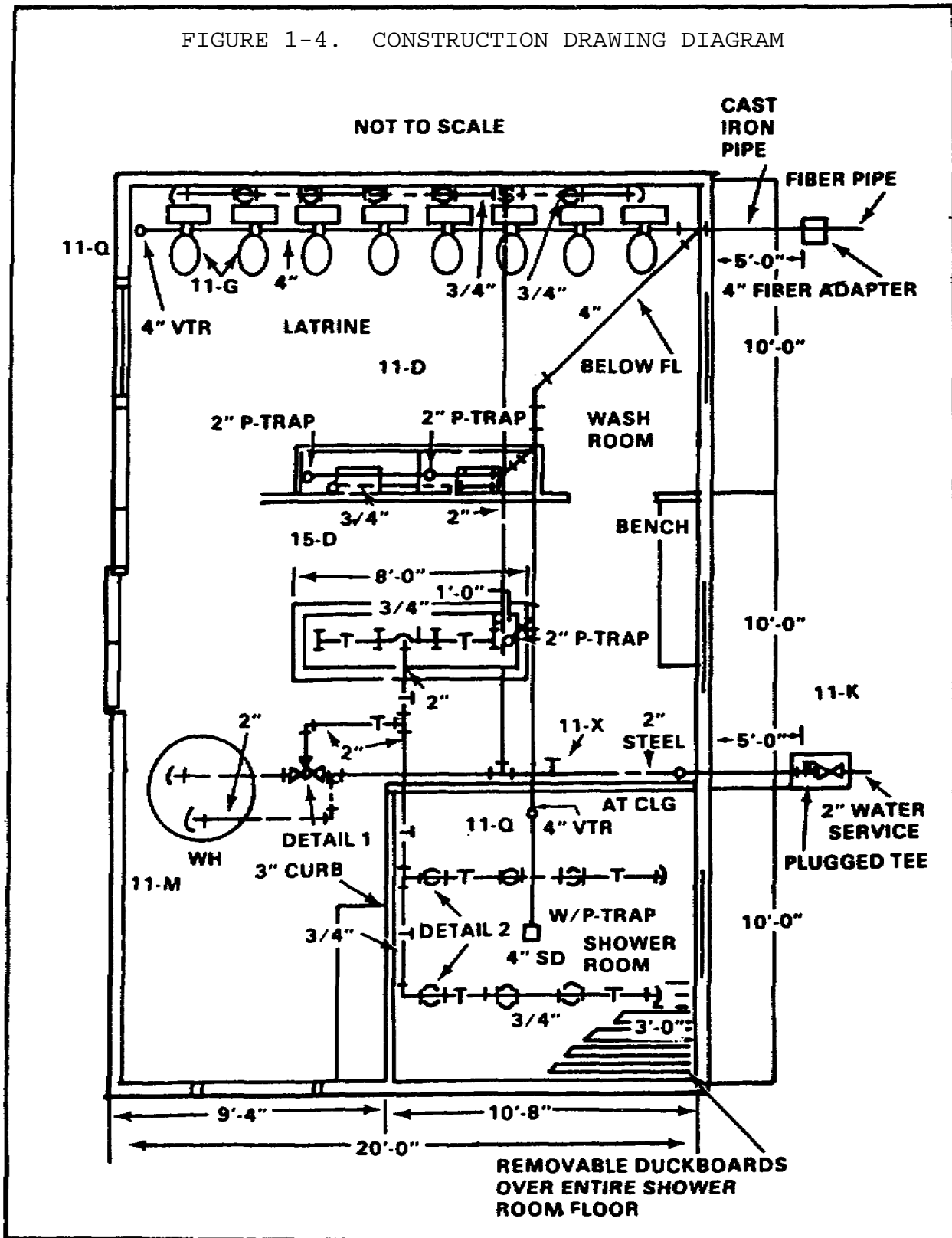
1/4" = 1'

RATIO SCALE

2. The diagram is the part of the drawing that uses symbols to show the location of the water system, waste system, and fixtures. See figure 1-4.



FIGURE 1-4. CONSTRUCTION DRAWING DIAGRAM



**Lesson 1/Learning Event 2**

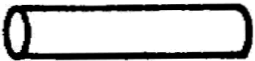


Learning Event 2

IDENTIFY WATER SYSTEM PIPELINES

3. Cold, hot, and tempered water lines are identified by symbols.

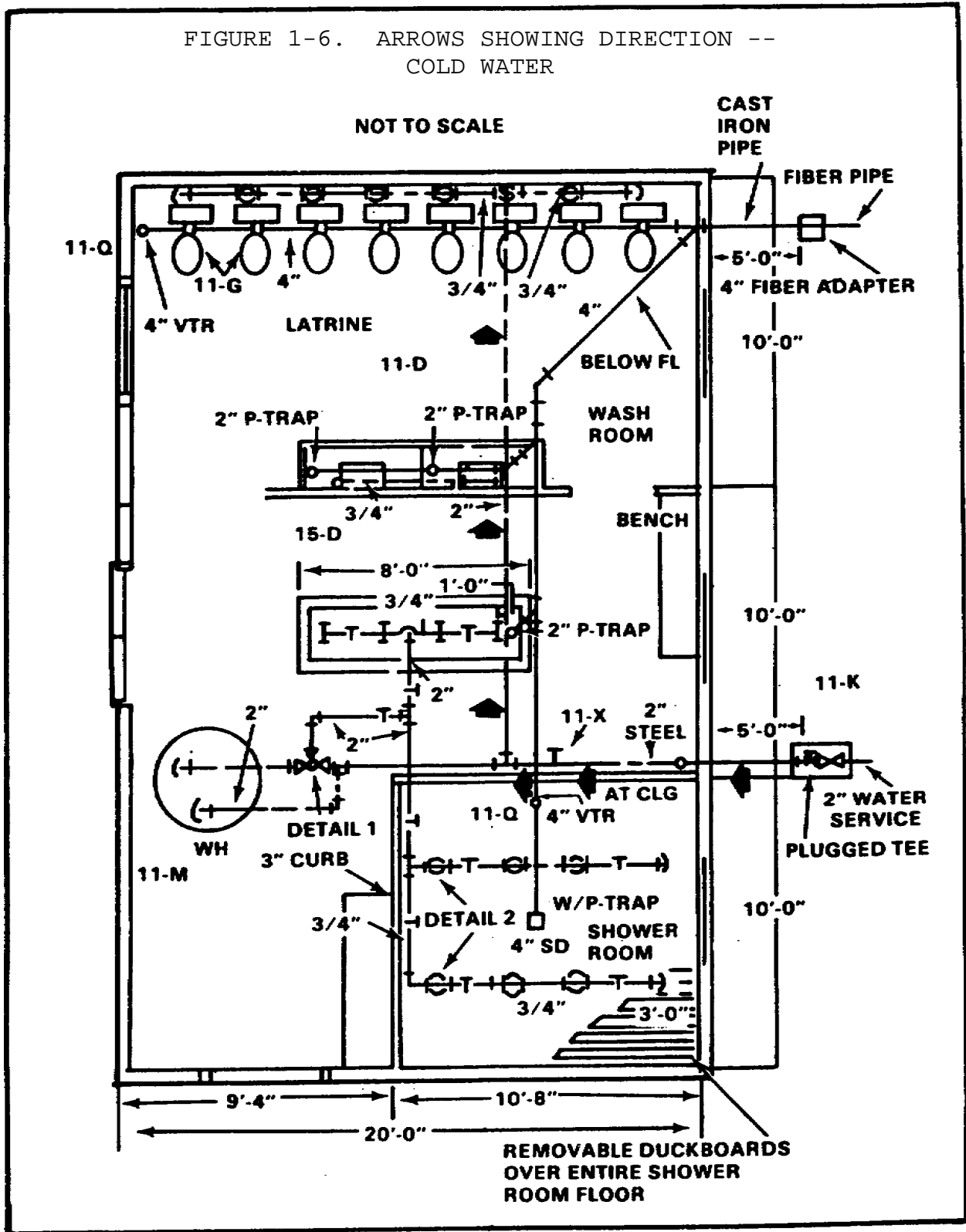
a. Figure 1-5 shows water pipeline symbols.

FIGURE 1-5. WATER PIPELINE SYMBOLS

<u>Symbols/Abbreviations</u>	<u>Meaning</u>	<u>Illustration</u>
-----	<b>COLD WATER LINES</b>	
-----	<b>HOT WATER LINES</b>	
-T-----T-	<b>TEMPERED WATER LINES</b>	

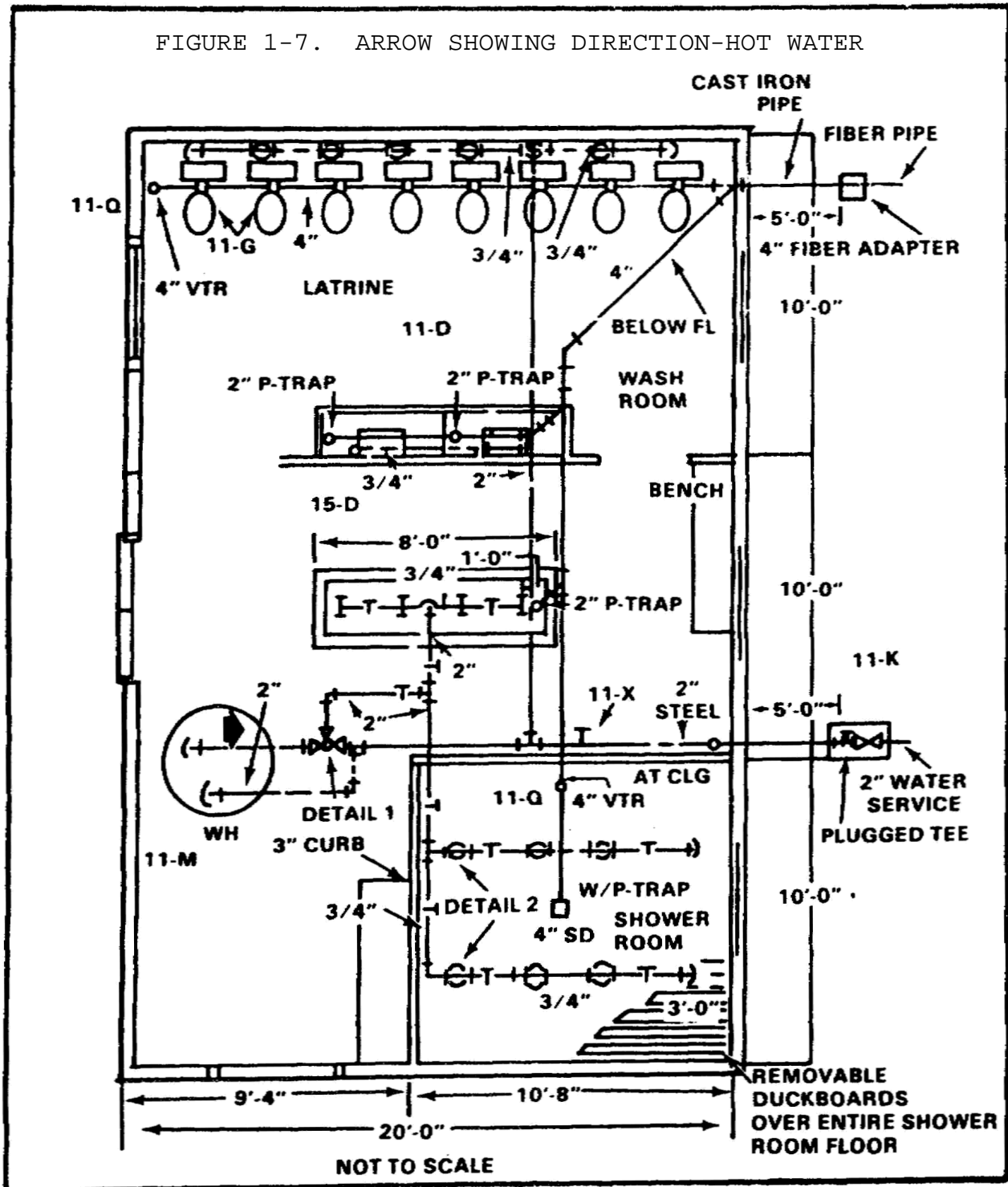
b. The arrows on the diagram in figure 1-4 show the location and direction of the cold water line.

FIGURE 1-6. ARROWS SHOWING DIRECTION -- COLD WATER

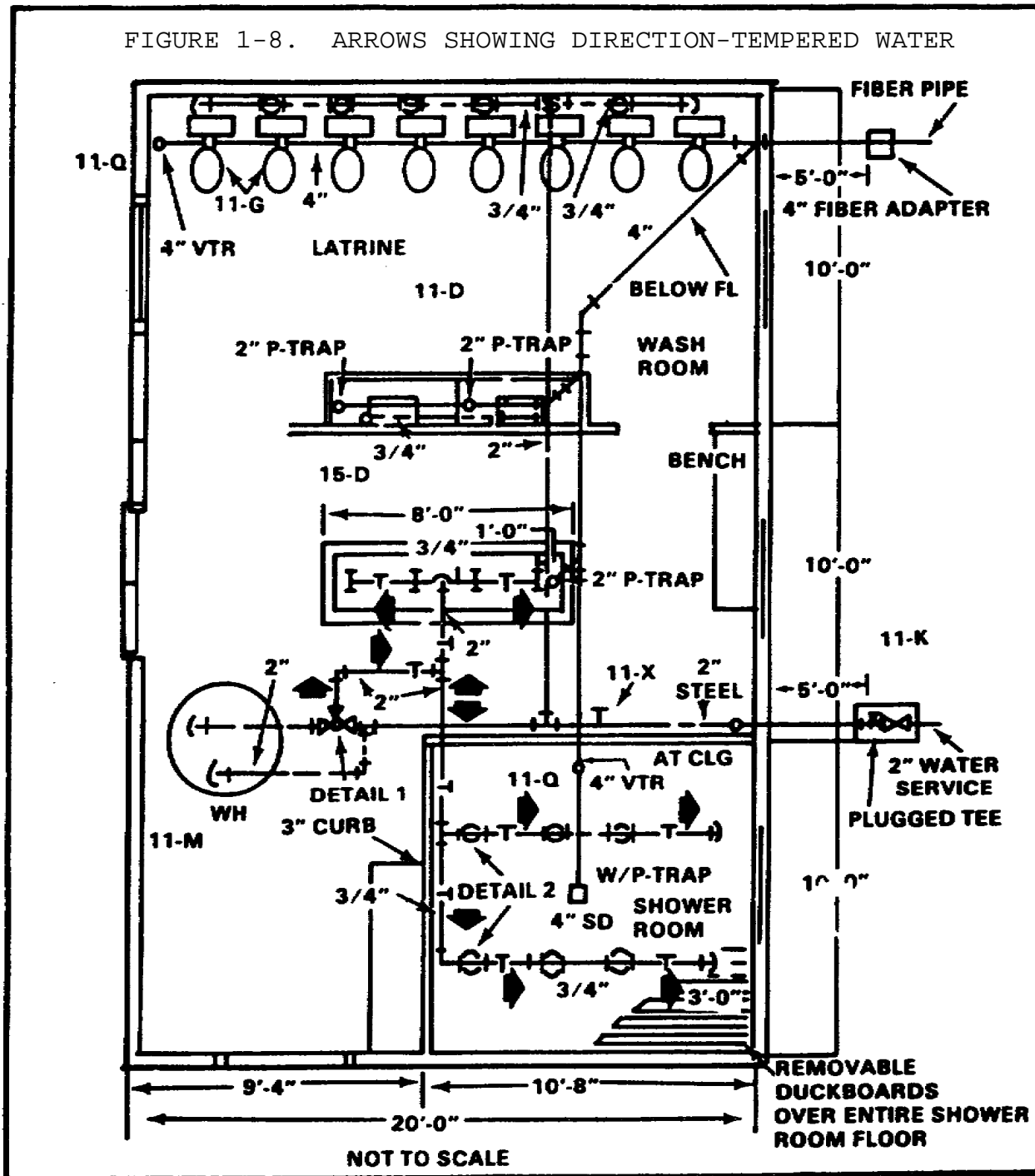


Lesson 1/Learning Event 2

c. The arrow on the diagram in figure 1-7 shows the location and direction of the hot water line.



d. The arrows in the diagram in figure 1-8 show the location and direction of the tempered water line.



4. Fittings connect and change the directions of water line pipe runs. These fittings are identified by symbols.

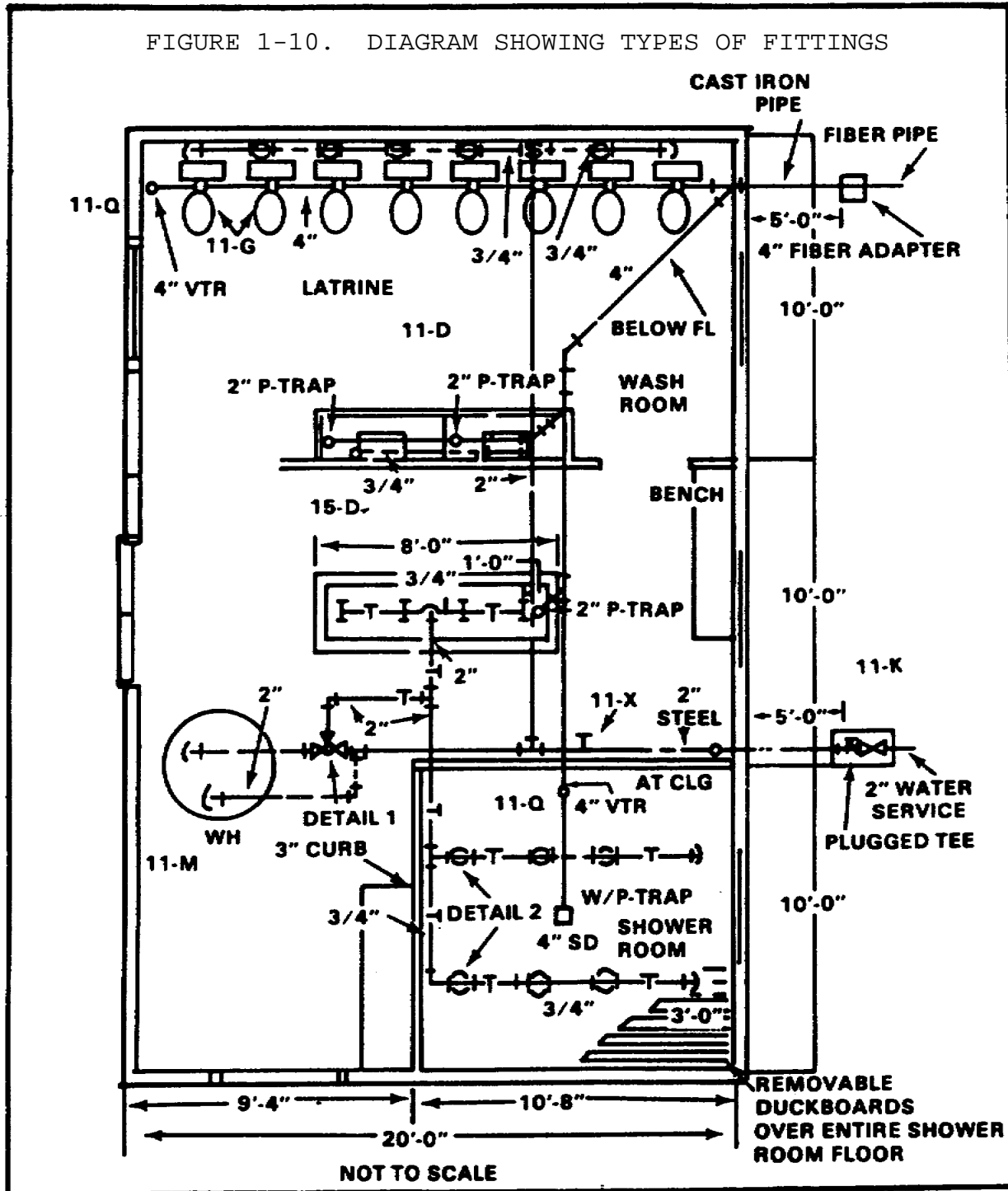
Lesson 1/Learning Event 2

a. Figure 1-9 shows water-pipe-fitting symbols.

FIGURE 1-9. WATER-PIPE-FITTING SYMBOLS

<u>Symbols/Abbreviations</u>	<u>Meaning</u>	<u>Illustration</u>
	<b>ELBOW TURNED DOWN</b>	
	<b>ELBOW TURNED UP</b>	
	<b>ELBOW SIDE OUTLET UP</b>	
	<b>ELBOW</b>	
	<b>TEE</b>	
	<b>TEE, OUTLET DOWN</b>	
	<b>TEE, OUTLET UP</b>	
	<b>TEE, SIDE OUTLET UP</b>	
	<b>TEE, SIDE OUTLET DOWN</b>	
	<b>FLANGED</b>	
	<b>SCREWED</b>	

b. Figure 1-10 shows water-pipe-fitting symbols used on a diagram.



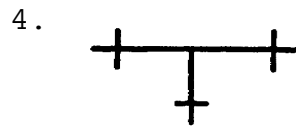
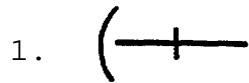
**Lesson 1/Learning Event 2**

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Self-Check Exercise

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Match the following water-pipe-fitting symbols with their descriptions.



- A. Tee
- B. Elbow turned down
- C. Tee, outlet up
- D. Elbow turned up

---

Self-Check Exercise Solutions

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Did you match 1 through 4 as follows?

- 1. B. Elbow turned down
- 2. C. Tee, outlet up
- 3. D. Elbow turned up.
- 4. A. Tee




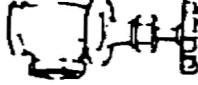

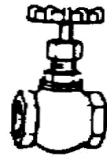





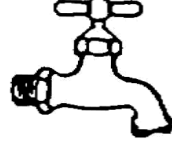
If you failed to match 1 through 4 above correctly, go back and review the water-pipe-fitting symbols before continuing the lesson. If you matched 1 through 4 above correctly, good work! Continue with the lesson.



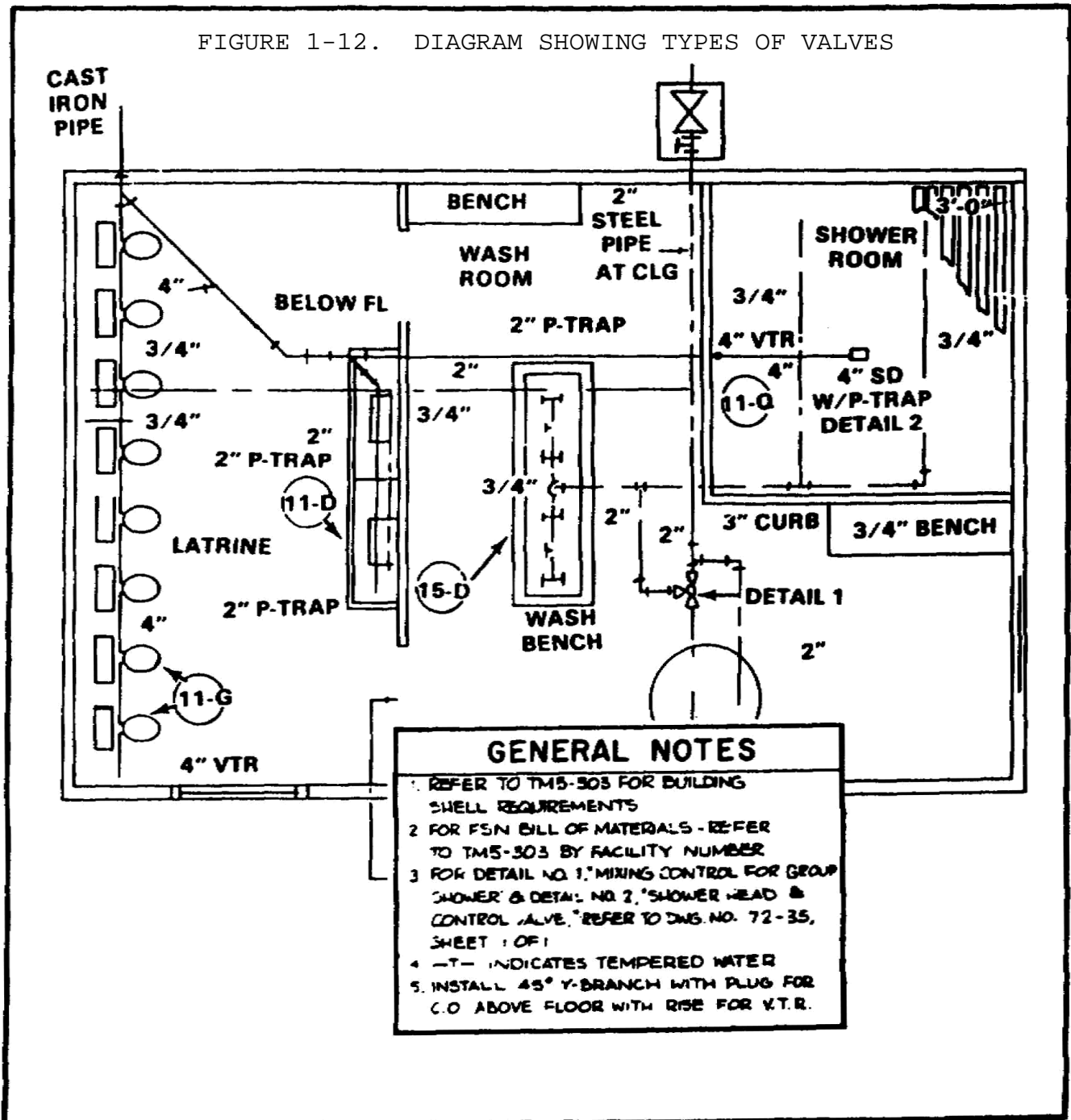
5. Valves control the flow of water. Gate valves turn water flow on or off. Globe valves control flow of water. Faucets turn water on and off at a fixture such as lavatory or sink.

a. Figure 1-11 shows symbols used for valves.

FIGURE 1-11. VALVE SYMBOLS

<u>Symbols/Abbreviations</u>	<u>Meaning</u>	<u>Illustration</u>
	<b>GATE VALVE</b>	
	<b>GATE VALVE ANGLED</b>	
	<b>GLOBE VALVE</b>	
	<b>GLOBE VALVE ANGLED</b>	
 PB	<b>FAUCET, PLAIN BIBB</b>	
 HB	<b>FAUCET, HOSE BIBB</b>	

b. Figure 1-12 shows valve symbols used on a diagram.

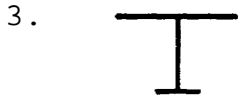


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Self-Check Exercise

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Match the following valve symbols with the valve descriptions.




- A. Faucet, hose bibb
- B. Gate valve
- C. Globe valve


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Self-Check Exercise Solutions

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How did you do? Check your responses with those below.

1.  is a gate valve. It is used to turn water flow on or off.

2.  is a globe valve. It is used to control the flow of water.

3.  is a faucet, hose bibb. It is used to turn water on or off at fixtures such as a lavatory.

If you had a hard time, review valve symbols and their uses again. If you got them all correct, good work. Continue with the lesson.

Learning Event 3  
IDENTIFY FIXTURE SYMBOLS

6. The fixture symbols in a construction drawing show the type of fixture and its location.

a. Figure 1-13 shows fixture symbols.

FIGURE 1-13. FIXTURE SYMBOLS


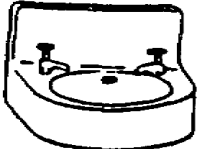

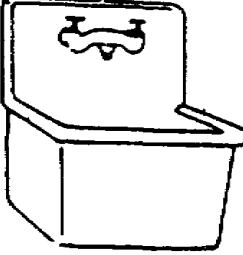

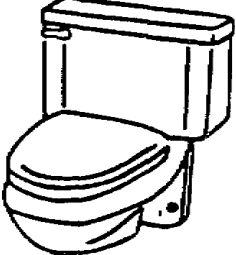
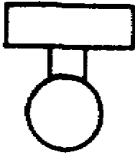
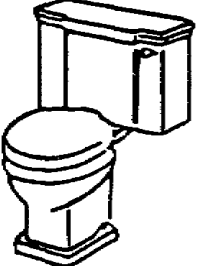
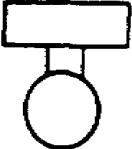
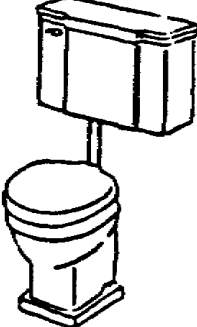
<u>Symbols/Abbreviations</u>	<u>Meaning</u>	<u>Illustration</u>
 WH	LAVATORY, WALL HUNG	
 SS	SINK, SERVICE WALL HUNG	
	WATER CLOSET, WALL HUNG, WITH TANK	
 LT	WATER CLOSET, LOW TANK	
 WH	WATER CLOSET, WITH WALL HUNG TANK	

FIGURE 1-13. FIXTURE SYMBOLS (CONTINUED)

Symbols/Abbreviations

Meaning

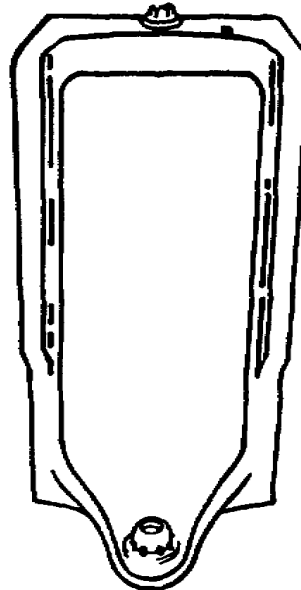
Illustration



**URINAL,  
WALL HUNG**



**URINAL,  
STALL TYPE**



**TU**

**URINAL,  
TROUGH TYPE**

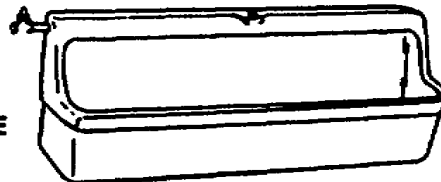
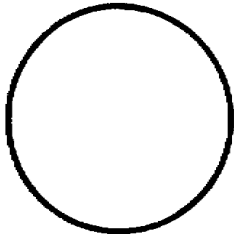


FIGURE 1-13. FIXTURE SYMBOLS (CONTINUED)

Symbols/Abbreviations

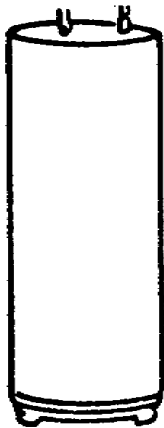
Meaning

Illustration



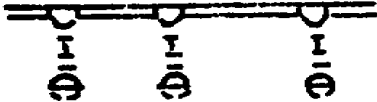
WH

WATER HEATER



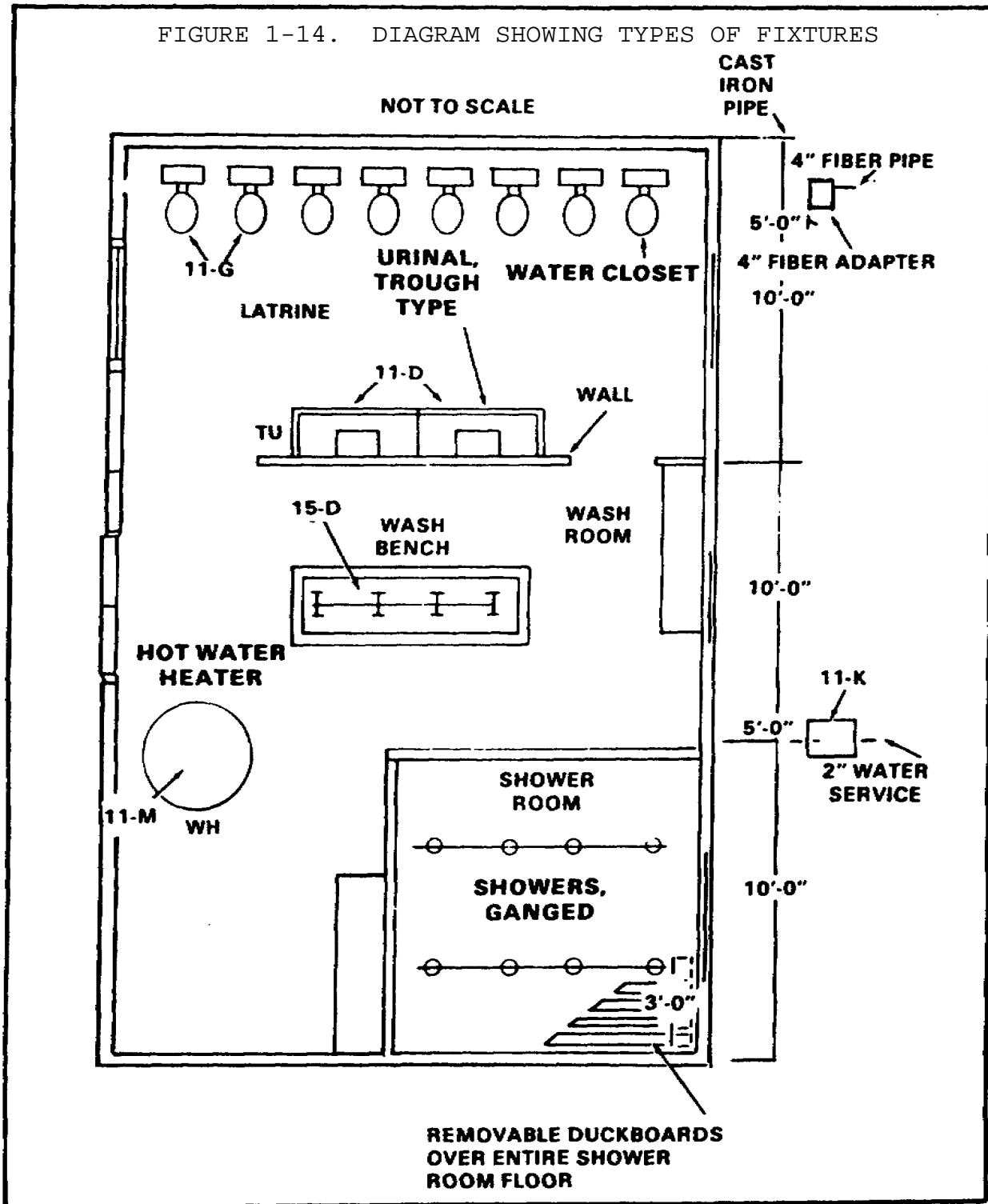
PLAN

SHOWERS, GANGED



ELEVATION

b. Figure 1-14 shows fixture symbols used on a diagram.



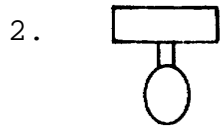
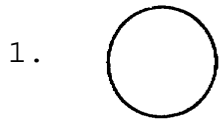


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Self-Check Exercise

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Match the following fixture symbols with the fixture descriptions.



- A. Water closet
- B. Urinal, wall-hung
- C. Sink service, wall-hung
- D. Water heater